



ABSTRACT BOOK

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Adsorption of Doxorubicin on the surface of magnetically sensitive nanocomposite $\text{Fe}_3\text{O}_4/\text{Al}_2\text{O}_3/\text{C}$

Kusiak N.V.¹, Kornichuk N.M.², Gorbyk P.P.², Petranovska A.L.²

¹ Ivan Franko Zhytomyr State University,
V. Berdychevska Str., 40, Zhytomyr-10008, Ukraine
E-mail: nkusyak@ukr.net

² Chuiko Institute of Surface Chemistry of the NAS of Ukraine.
General Naumov Str., 17, Kyiv-03164, Ukraine

Magnetically sensitive nanocomposites with carbon components are promising in the development of new types of carriers for targeted delivery of drugs, contrast agents for magnetic resonance imaging, medical hyperthermia, magnetically controlled adsorbents for various functional purposes.

The aim of this work is to study the adsorption activity of promising for practical use of magnetic-sensitive nanocomposites of the core-shell type based on single-domain magnetite and carbon against the chemotherapeutic drug Doxorubicin (DOX).

A nanocomposite of $\text{Fe}_3\text{O}_4/\text{Al}_2\text{O}_3/\text{C}$ was synthesized and characterized by a complex of physicochemical methods. According to the results of research: XRD, mass spectrometry, DTA / DTGA, TEM, determination of specific surface area (SSA) and magnetic granulometry the magnetic properties are preserved and a nanocomposite of the core-shell type with a high value of SSA is formed.

The processes of adsorption/desorption, the dependence of adsorption on pH are investigated. DOX adsorption was studied under static conditions ($T = 25^\circ\text{C}$, $g = 0.03\text{g}$, $V = 0.05\text{l}$, medium 0.9% NaCl, $\text{pH} = 5$ and 7), the required pH values (I-160MI) were established by adding solutions 0.1 N HCl and NaOH. Quantitative parameters of adsorption were calculated by the formula: $A = (C_0 - C_{eq}) \cdot V / g$, where C_0 and C_{eq} are the concentration of the initial solution and the equilibrium concentration (mg/l), V – is the volume of the solution (l), g – is the weight of the adsorbent (g). The change in DOX concentrations as a result of adsorption was recorded by spectrophotometric method (UNICO 2100 UV).

According to the results of mathematical processing of kinetic dependences and isotherms, it is established that the adsorption kinetics of DOX corresponds to the pseudo-second order model ($A_{exp} = 6.79 \text{ mg/g}$, $A_{calc} = 6.96 \text{ mg/(g} \cdot \text{min)}$ = 0.0352, $V_p, \text{ mg/(g} \cdot \text{min)}$ = 1.62, $r^2=0.99$) with a limiting stage of external diffusion ($r^2=0.99$) and the isotherm corresponds to the Freundlich model ($r^2=0.97$).

- Kurta S.A.321
 Kushch O.V.107, 112, 126
 Kushlyk M.410
 Kushlyk M.O.316
 Kushnerov O.I.127
 Kusiak N.V.59
 Kussyak A.P.58, 60
 Kutsevol N.164, 225, 226, 276, 462
 Kutsevol N.V.165, 228, 403
 Kutuzova A.S.138
 Kuzema P.O.82
 Kuzenko S.V.205
 Kuziv Ia.B.256
 Kuziv Y.I.228
 Kuziv Yu.164, 276, 462
 Kuzmich H.244
 Kuzminchuk A.V.132
 Kuznetsova L.S.32
 Kuzyk O.V.128, 428
 Kychkyruk O.487, 489
 Kyrii S.O.85, 150, 193
 Kyriienko P.I.134, 468
 Kyryliv V.I.341, 344
 Kyryliv Y.B.341
 Kyshkarova V.V.471
 Kysil Dmytro195
 Kytsya A.R.118, 189
 Konoplyuk S.M.422
- L**
- Labbe C.536
 Lacková V.46
 Laguta I.125
 Laguta I.V.82
 Laikhtman A.537
 Lakhnik A.M.38, 463
 Lamberti P.95
 Lamonova K.139
 Langová Š.5482
 Lapchuk I.268
 Larina O.V.114, 134, 468
 Laroze D.432
- Latushka S.I.514
 Latushka T.V.514
 Lavrynenko O.M.78
 Lavs'ka V.O.305
 Lawera Z.391, 461
 Lazarenko M.M.290, 304, 474
 Lazarenko M.V.304, 474
 Lazarenko O.A.147, 485
 Lazorenko Ya.P.102
 Lebovka N.I.101, 346
 Legut D.448, 481, 482
 Lelyushok S.226
 Lemishka I.A.283, 284
 Len E.G.181, 455
 Len T.A.39, 67, 148
 Len T.S.455
 Len Ye.G.215
 Lepikh Ya.I.36
 Lesiuk A.I.314
 Lesyuk R.61
 Levchenko G.G.87, 88, 167
 Lewandowski W.168, 391, 392,
 393, 394, 461, 486, 510, 515, 550
 Lewandowski Wiktor492
 Li Quanjun86, 88
 Liakh-Kaguy N.S.121, 333
 Liakhovetskyi V.379
 Liard M.469
 Liedienov N.A.86, 87, 88, 167
 Lienau C.216
 Lin C.517, 518
 Lin Cao120
 Lin D.406
 Linnik O.125
 Lipatov O.Ye.27
 Lisachuk G.V.286
 Lisnyak V.V.165, 255, 262,
 263, 299, 300, 301, 305, 306
 Litvin P.M.231, 232
 Litynska M.140
 Lizunov V.V.455